



## DATA SHEET

# CISCO AIRONET 802.11A/B/G WIRELESS PCI ADAPTER

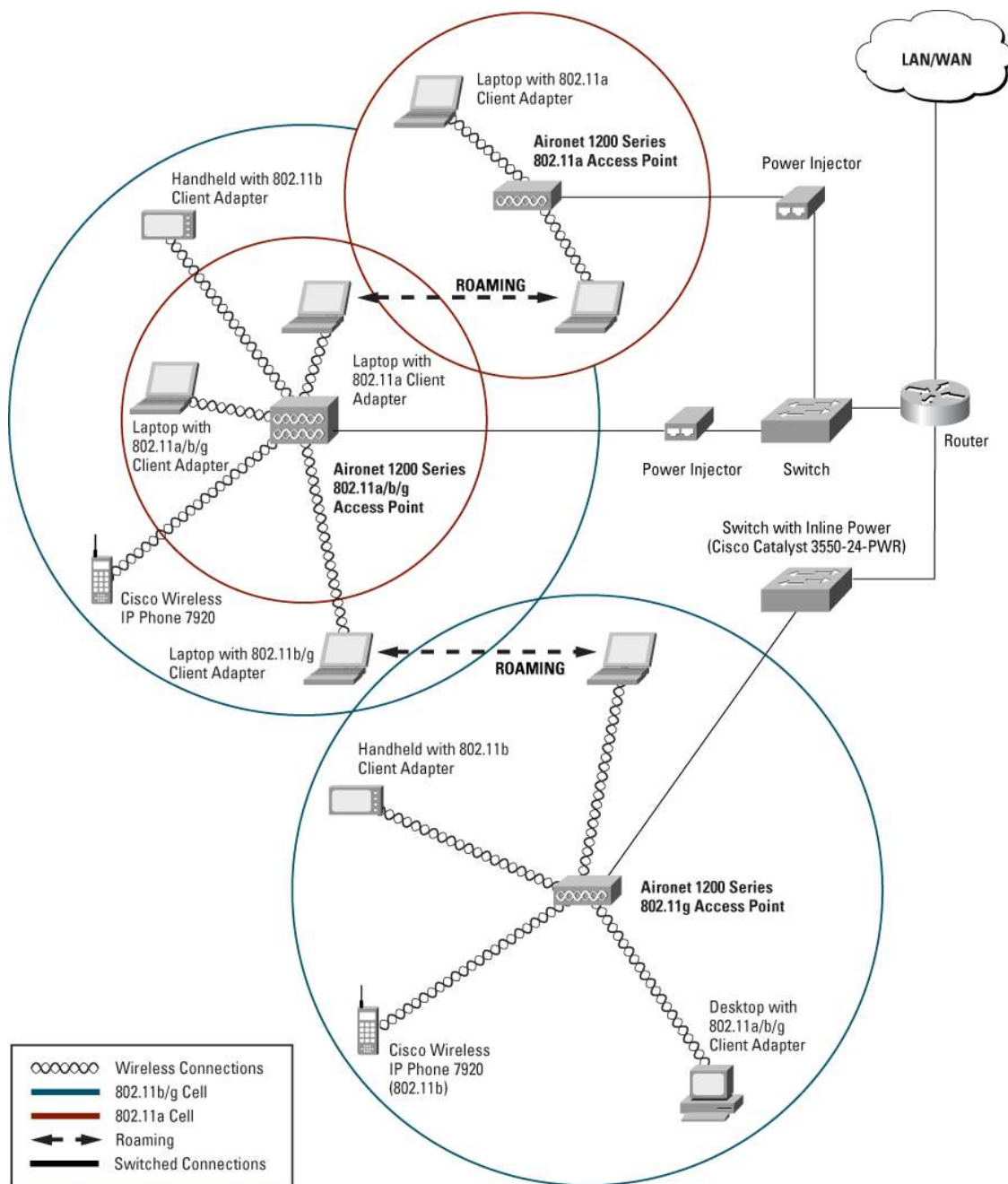
### PRODUCT OVERVIEW

The Cisco Aironet<sup>®</sup> IEEE 802.11a/b/g Wireless PCI Adapter provides high-performance 54 Mbps connectivity in the 2.4 and 5 GHz bands. Whether configured to support single 802.11b coverage, single 802.11g coverage, single 802.11a coverage, dual-mode 802.11a/g coverage or tri-mode 802.11a/b/g coverage, the Cisco Aironet 802.11a/b/g Wireless PCI Adapter is Wi-Fi compliant and combines the freedom of wireless connectivity with the performance, security, and manageability that businesses require (Figure 1).

The low-profile form factor and two-meter cable length provide significant flexibility for installation in low-profile devices, such as slim desktops and point-of-sale (POS) devices. For versatility, both a low profile and a standard profile bracket frame are included with the adapter. The attached dual-band 2.4/5 GHz 1 dBi effective gain antenna has a 2-meter cable allowing for optimal placement to maximum performance.



**Figure 1.** Client devices equipped with Cisco Aironet 802.11a/b/g wireless PCI adapters, such as desktop computers, POS devices, and information kiosks, can easily be moved or roam freely throughout a facility via communications with multiple IEEE 802.11a/b/g access points.



Features include:

- Superior range and throughput
- Secure network communications with the Cisco Wireless Security Suite and support for Wi-Fi Protected Access (WPA)
- Comprehensive utilities for flexible, easy configuration and management
- World mode for international roaming

## ENTERPRISE-CLASS SECURITY SOLUTION

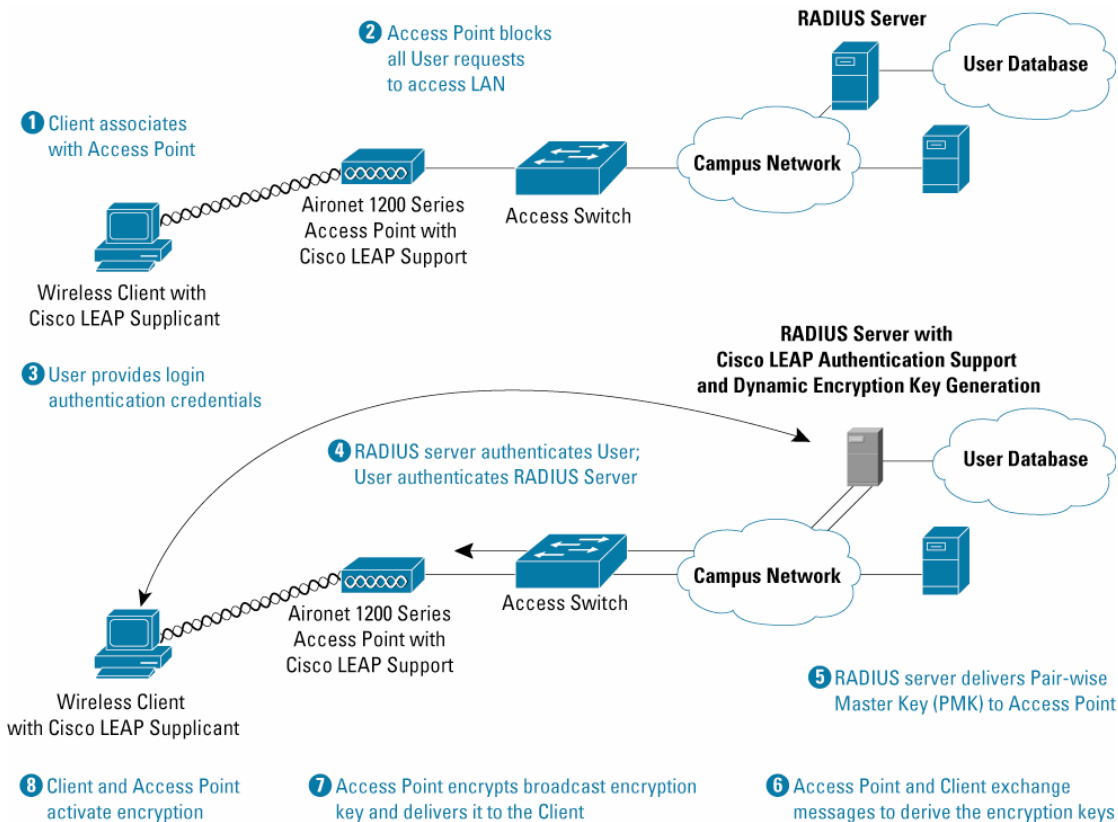
Designed with enterprise-class security requirements in mind, the Cisco Aironet 802.11a/b/g Wireless PCI Adapter is a key client-side component of the award-winning Cisco Wireless Security Suite. Based on the 802.1X standard for port-based network access, the Cisco Wireless Security Suite takes advantage of the Extensible Authentication Protocol (EAP) framework for user-based authentication (Figure 2). This solution also supports WPA, the Wi-Fi Alliance certification for interoperable, standards-based wireless LAN security.

The Cisco Aironet 802.11a/b/g Wireless PCI Adapter supports the most common 802.1X authentication types, including Cisco LEAP, Extensible Authentication Protocol Transport Layer Security (EAP-TLS), Protected Extensible Authentication Protocol-Generic Token Card (PEAP-GTC), and Protected Extensible Authentication Protocol-Microsoft Challenge Handshake Authentication Protocol Version 2 (PEAP-MSCHAP V2). A wide selection of RADIUS servers, such as the Cisco Secure Access Control Server (ACS) and Cisco Access Registrar (AR) server, can be used for enterprise-class centralized security and management that includes:

- Strong, mutual authentication to ensure that only legitimate clients associate with legitimate and authorized network RADIUS servers via authorized access points
- Dynamic per-user, per-session encryption keys that automatically change on a configurable basis to protect the privacy of transmitted data
- Stronger encryption, such as message integrity check (MIC), per-packet keys via initialization vector hashing, and broadcast key rotation, provided by Temporal Key Integrity Protocol (TKIP) enhancements
- RADIUS accounting records for all authentication attempts
- Ready for IEEE 802.11i/WPA2 Advanced Encryption Standard (AES) support

For more information on wireless security, visit: <http://www.cisco.com/go/aironet/security>.

**Figure 2.** The Cisco Wireless Security Suite is an enterprise-class security system based on the 802.1X architecture



## CISCO STRUCTURED WIRELESS-AWARE NETWORK

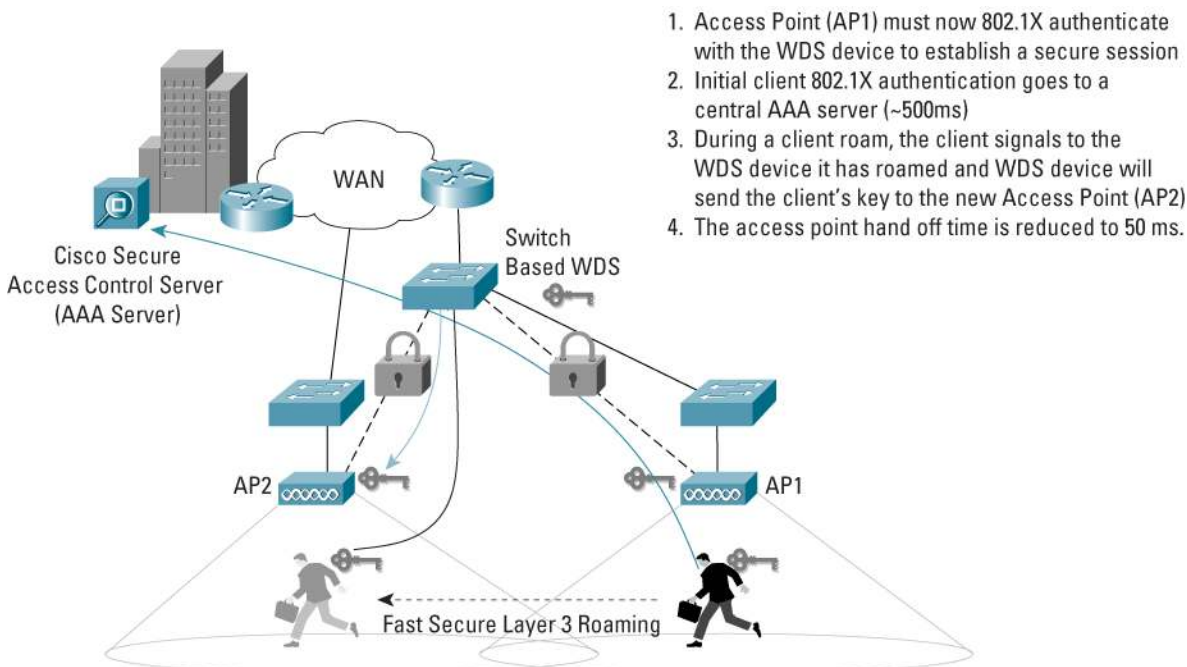
The Cisco Aironet 802.11a/b/g Wireless PCI Adapter is a key component of the Cisco Structured Wireless-Aware Network (SWAN). Cisco SWAN is a framework to integrate and extend wired and wireless networks to deliver the lowest possible total cost of ownership for companies deploying WLANs. Cisco SWAN extends “wireless awareness” into important elements of the network infrastructure, providing the same level of security, scalability, reliability, ease of deployment, and management for wireless LANs that organizations have come to expect from their wired LANs.

Wireless domain services (WDS) is introduced with the Cisco Structured Wireless-Aware Network. WDS is a collection of Cisco IOS Software features that expand WLAN client mobility, simplify WLAN deployment and management and enhance WLAN security. These services—supported on access points, client devices, and the Cisco Catalyst® 6500 Series Wireless LAN Services Module (WLSM) today and other Cisco LAN switches and routers in 2005—include radio management aggregation, fast secure roaming, client tracking, and WAN link remote site survivability. WDS radio management aggregation supports radio frequency (RF) managed services such as rogue access point detection for WLAN Intrusion Detection System (IDS), interference detection, assisted site surveys and self-healing wireless LANs. For more information on Cisco SWAN, visit:

<http://www.cisco.com/go/swan>.

Fast secure roaming is supported by Cisco and Cisco Compatible client devices in conjunction with Cisco Aironet, Cisco IOS Software-based access points. With fast secure roaming, authenticated client devices can roam securely from one access point to another, within or across subnets, without any perceptible delay during reassociation. Fast secure roaming supports latency-sensitive applications such as wireless voice over IP (VoIP), enterprise resource planning (ERP), or Citrix- based solutions (Figure 3).

**Figure 3.** Fast Secure Roaming



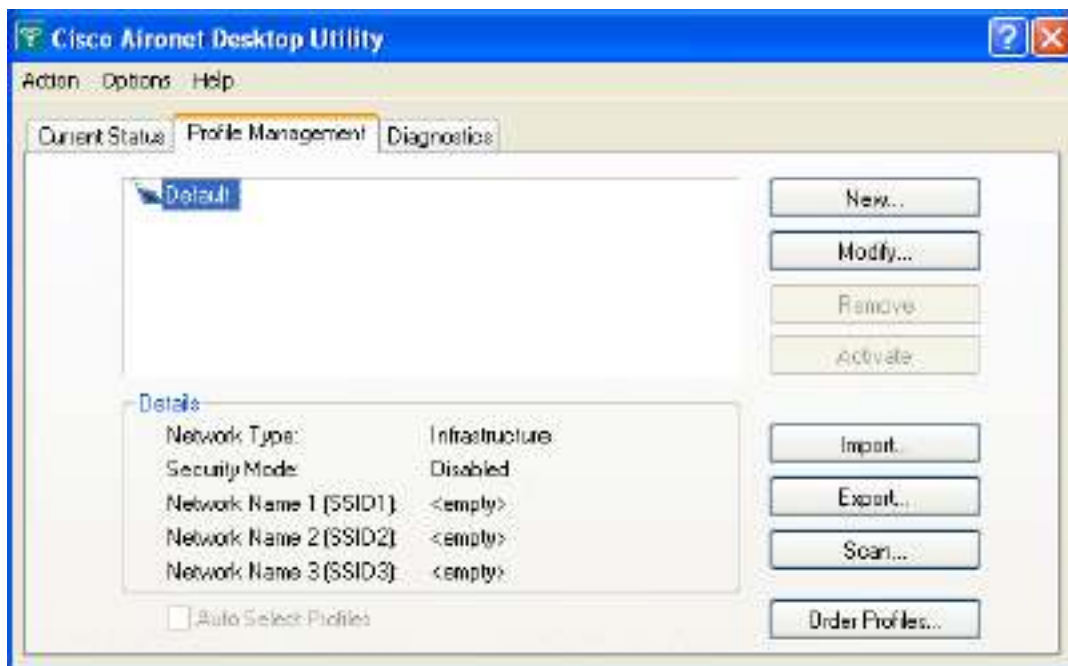
Note: Because the WDS handles roaming and reauthentication, the WAN link is not used

## ENHANCED CLIENT NETWORK MANAGEMENT FEATURES

A new and improved set of client utilities includes the Aironet Desktop Utility (ADU), Aironet System Tray Utility (ASTU), and Aironet Client Administration Utility (ACAU). Together, these utilities provide an intuitive graphical user interface (GUI) for easy configuration, monitoring, and management of the Cisco Aironet 802.11a/b/g PCI Adapter. Enhanced client network management features include:

- Profile Manager—Allows users to create specific profile settings for various environments, such as the office and home, making it simple for telecommuters and business travelers to move from one environment to another (Figure 4)
- Customized profile settings—Lets users individually select channel, service set identifier (SSID), Wired Equivalent Privacy (WEP) key, and the authentication method for different locations
- Cisco LEAP authentication status screen—Provides status updates regarding the Cisco LEAP authentication process
- Auto-selection of profiles, including Cisco LEAP profile—Provides automatic selection of established profiles, including Cisco LEAP profile without requiring the storage of Cisco LEAP username and password in the profile
- System tray icon—Provides easy access to wireless LAN connection information and one-click access to common actions such as the manual selection of a profile or turning the radio on/off.
- Aironet Client Monitor—Provides a subset of Aironet Desktop Utility features such as status information about the client adapter and access to basic tasks such as selecting a profile. This application runs from the system tray.
- Troubleshooting Utility—Provides step-by-step details on the process of connecting to an access point with highlights on why a connection failed. (Figure 5)
- Support for the most popular enterprise operating systems—Windows XP and Windows 2000

**Figure 4.** Cisco Aironet Desktop Utility (Profile Management) Screen



An Aironet Client Adapter installation wizard for Windows (CB21AG and PI21AG) is provided for easy installation of the client firmware, drivers, and utilities. The wizard offers several installation options: install client utilities and driver, install driver only, or make driver installation diskette(s). For ease of use, the installation wizard image file is a self-extracting (.exe) file.

Figure 5. Troubleshooting Utility Screen



Table 1. Product Features and Benefits

Feature	Benefit
<b>Cisco Wireless Security Suite</b>	IEEE 802.1X support, including Cisco LEAP, PEAP-GTC, PEAP-MSCHAP V2, and EAP-TLS for mutual authentication with dynamic per-user, per-session encryption keys via TKIP enhancements. Full support for WPA. Ready for IEEE 802.11i/WPA2 Advanced Encryption Standard (AES) Support.
<b>Enhanced Client Network Management Features</b>	Bundled with comprehensive, easy-to-use client network management utilities to provide a secure, intuitive, and convenient way to manage and configure the adapter.
<b>Cisco LEAP Single Sign-On</b>	Convenient option to utilize log-in credentials for LEAP sign-on on the user's network, thus eliminating the need to enter a second set of credentials.
<b>Low Profile Form Factor</b>	Low-profile PCI form factor allows installation in low-profile device, such as slim desktops and POS devices. Both a low-profile and a standard-profile bracket frame are included with the product.
<b>2 Meter Antenna Cable</b>	The attached dual band 2.4/5 GHz 2 dBi effective gain antenna has a 2-meter cable allowing for optimal placement to maximize performance.
<b>Cisco SWAN</b>	A comprehensive Cisco framework to integrate and extend wired and wireless networks to deliver the lowest possible total cost of ownership for companies deploying WLANs. Cisco SWAN extends "wireless awareness" into important elements of the network infrastructure, providing the same level of security, scalability, reliability, ease of deployment, and management for wireless LANs that organizations have come to expect from their wired LANs.

Feature	Benefit
<b>Wireless Domain Services (WDS)</b>	A component of Cisco SWAN, WDS is a collection of Cisco IOS Software features that enhance WLAN client mobility and simplify WLAN deployment and management. WDS includes radio management aggregation, fast secure roaming, client tracking, and WAN link remote site survivability.
<b>Fast Secure Roaming</b>	Allows authenticated client devices to roam securely from one access point to another, within or across subnets, without any perceptible delay during reassociation. Provides support for latency-sensitive applications such as VoIP, ERP and Citrix.

**Table 2.** Product Specifications

<b>Part Number</b>
<ul style="list-style-type: none"> <li>• AIR-PI21AG-A-K9</li> <li>• AIR-PI21AG-E-K9</li> <li>• AIR-PI21AG-J-K9</li> <li>• AIR-PI21AG-W-K9</li> <li>• AIR-PI21AG-A-K9-10 (10-unit bulk pack)</li> </ul> <p>Regulatory Domains:</p> <ul style="list-style-type: none"> <li>• A=Americas</li> <li>• E=ETSI</li> <li>• J=TELEC (Japan)</li> <li>• W=Rest-of-world</li> </ul> <p>Customers are responsible for verifying approval for use in their country. Please see <a href="http://www.cisco.com/go/aironet/compliance">http://www.cisco.com/go/aironet/compliance</a> to verify approval and to identify the regulatory domain that corresponds to a particular country.</p>
<b>Form Factor</b>
Standard and Low Profile Type II PCI
<b>Interface</b>
<ul style="list-style-type: none"> <li>• Standard PCI Interface</li> <li>• PCI Rev. 2.3 compliant</li> </ul>
<b>Data Rates Supported</b>
1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, 54 Mbps
<b>Network Standard</b>
IEEE 802.11a/b/g
<b>Operating Voltage</b>
3.3 V ( $\pm 0.3$ V)
<b>LED</b>
Status (green) and Activity (amber)
<b>Media Access Protocol</b>
Carrier-Sense Multiple Access w/ Collision Avoidance (CSMA/CA)



## Wireless Medium

802.11g:

- Direct Sequence Spread Spectrum (DSSS) and Orthogonal Frequency Divisional Multiplexing (OFDM)

802.11a:

- OFDM

## Modulation

### DSSS

- Differential Binary Phase Shift Keying (DBPSK) @ 1 Mbps
- Differential Quadrature Phase Shift Keying (DQPSK) @ 2 Mbps
- Complementary Code Keying (CCK) @ 5.5 and 11 Mbps

### OFDM

- BPSK @ 6 and 9 Mbps
- QPSK @ 12 and 18 Mbps
- 16-Quadrature Amplitude Modulation (QAM) @ 24 and 36 Mbps
- 64-QAM @ 48 and 54 Mbps

## Frequency Bands

- 2.40 to 2.4897 GHz
- 5.15 to 5.35 GHz (FCC UNII 1 and UNII 2)
- 5.725 to 5.85 GHz (FCC UNII 3)
- 5.15 to 5.35 GHz (ETSI)
- 5.470 to 5.725 (ETSI)
- 5.15 to 5.25 GHz (Japan)

## Delay Spread

- |                     |                    |
|---------------------|--------------------|
| • 350 ns @ 1 Mbps   | • 250 ns @ 12 Mbps |
| • 300 ns @ 2 Mbps   | • 220 ns @ 18 Mbps |
| • 200 ns @ 5.5 Mbps | • 160 ns @ 24 Mbps |
| • 400 ns @ 6 Mbps   | • 100 ns @ 36 Mbps |
| • 250 ns @ 9 Mbps   | • 90 ns @ 48 Mbps  |
| • 130 ns @ 11 Mbps  | • 70 ns @ 54 Mbps  |

## Receive Sensitivity 802.11g (typical)

- |                      |                     |
|----------------------|---------------------|
| • -94 dBm @ 1 Mbps   | • -86 dBm @ 12 Mbps |
| • -93 dBm @ 2 Mbps   | • -86 dBm @ 18 Mbps |
| • -92 dBm @ 5.5 Mbps | • -84 dBm @ 24 Mbps |
| • -86 dBm @ 6 Mbps   | • -80 dBm @ 36 Mbps |
| • -86 dBm @ 9 Mbps   | • -75 dBm @ 48 Mbps |
| • -90 dBm @ 11 Mbps  | • -71 dBm @ 54 Mbps |

## Receive Sensitivity 802.11a (typical)

- | 5150 to 5250 MHz    | 5250 to 5350 MHz    | 5725 to 5805 MHz    | 5.470 -5.725 GHz    |
|---------------------|---------------------|---------------------|---------------------|
| • -87 dBm @ 6 Mbps  | • -89 dBm @ 6 Mbps  | • -84 dBm @ 6 Mbps  | • -87 dBm @ 6 Mbps  |
| • -87 dBm @ 9 Mbps  | • -89 dBm @ 9 Mbps  | • -84 dBm @ 9 Mbps  | • -87 dBm @ 9 Mbps  |
| • -87 dBm @ 12 Mbps | • -89 dBm @ 12 Mbps | • -84 dBm @ 12 Mbps | • -87 dBm @ 12 Mbps |
| • -87 dBm @ 18 Mbps | • -85 dBm @ 18 Mbps | • -83 dBm @ 18 Mbps | • -87 dBm @ 18 Mbps |
| • -82 dBm @ 24 Mbps | • -82 dBm @ 24 Mbps | • -82 dBm @ 24 Mbps | • -82 dBm @ 24 Mbps |



- |   |   |   |   |
|---|---|---|---|
| <ul style="list-style-type: none"> <li>• -79 dBm @ 36 Mbps</li> <li>• -74 dBm @ 48 Mbps</li> <li>• -72 dBm @ 54 Mbps</li> </ul> | <ul style="list-style-type: none"> <li>• -79 dBm @ 36 Mbps</li> <li>• -74 dBm @ 48 Mbps</li> <li>• -72 dBm @ 54 Mbps</li> </ul> | <ul style="list-style-type: none"> <li>• -79 dBm @ 36 Mbps</li> <li>• -72 dBm @ 48 Mbps</li> <li>• -65 dBm @ 54 Mbps</li> </ul> | <ul style="list-style-type: none"> <li>• -79 dBm @ 36 Mbps</li> <li>• -74 dBm @ 48 Mbps</li> <li>• -72 dBm @ 54 Mbps</li> </ul> |
|---|---|---|---|

#### Available Transmit Power Settings

##### 802.11b/g:

- 20 dBm (100 mW) @ 1, 2, 5.5 and 11 Mbps
- 18 dBm (63 mW) @ 1, 2, 5.5, 6, 9, 11, 12, 18 and 24 Mbps
- 17 dBm (50 mW) @ 1, 2, 5.5, 6, 9, 11, 12, 18, 24 and 36 Mbps
- 15 dBm (30 mW) @ 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36 and 48 Mbps
- 13 dBm (20 mW) @ 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48 and 54 Mbps
- 10 dBm (10 mW) @ 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48 and 54 Mbps

##### 802.11a:

- 16 dBm (40 mW) @ 6, 9, 12, 18 and 24 Mbps
- 14 dBm (25 mW) @ 6, 9, 12, 18, 24 and 36 Mbps
- 13 dBm (20 mW) @ 6, 9, 12, 18, 24, 36, 48 and 54 Mbps
- 11 dBm (13 mW) @ 6, 9, 12, 18, 24, 36, 48 and 54 Mbps
- 10 dBm (10 mW) @ 6, 9, 12, 18, 24, 36, 48 and 54 Mbps

Maximum power setting will vary according to individual country regulations.

#### Power Consumption Steady State

	Transmit	Receive	Standby	
<b>802.11a</b>	554 mA maximum	318 mA maximum	203 mA average	
<b>802.11b</b>	539 mA maximum	327 mA maximum	203 mA average	
<b>802.11g</b>	530 mA maximum	282 mA maximum	203 mA average	

#### Range

(Typical with PI21AG at maximum transmit power communicating with a AP1231AG configured with 2.2 dBi dipole antenna for 802.11g and 802.11b and 6dBi gain patch for 802.11a)

	<b>802.11a</b>	<b>802.11b/g</b>		
Indoor (typical)				
54 Mbps	45 ft (13 m)	90 ft (27 m)		
18 Mbps	110 ft (33 m)	180 ft (54m)		
11 Mbps		160 ft (48 m)		
6 Mbps	165 ft (50 m)	300 ft (91 m)		
1 Mbps		410 ft (124 m)		
Outdoor (typical)				
54 Mbps	100 ft (30 m)	250 ft (76 m)		
18 Mbps	600 ft (183 m)	600 ft (183 m)		
11 Mbps		1000 ft (304 m)		
6 Mbps	1000 ft (304 m)	1300 ft (396 m)		

1 Mbps		2000 ft (610 m)		
<b>Compliance</b>				
<b>Safety:</b> <ul style="list-style-type: none"> <li>• UL 60950</li> <li>• CSA 22.2 No. 60950</li> <li>• IEC 60950</li> <li>• EN 60950</li> </ul>	<b>Radio Approvals:</b> <ul style="list-style-type: none"> <li>• FCC Part 15.401-15.407</li> <li>• RSS-210 (Canada)</li> <li>• EN 301.893 (Europe)</li> <li>• ARIB STD-T71 (Japan)</li> <li>• AS 4268.2 (Australia)</li> <li>• FCC Part 15.247</li> <li>• RSS-210 (Canada)</li> <li>• EN 300.328 (Europe)</li> <li>• Telec 33 and 66 (Japan)</li> <li>• AS/NZS 3548 (Australia and New Zealand)</li> </ul>	<b>EMI and Susceptibility (Class B):</b> <ul style="list-style-type: none"> <li>• FCC Part 15.107 and 15.109</li> <li>• ICES-003 (Canada)</li> <li>• VCCI (Japan)</li> <li>• EN 301.489-1 and - 17 (Europe)</li> </ul>	<b>Other:</b> <ul style="list-style-type: none"> <li>• IEEE 802.11a, 802.11b and 802.11g</li> <li>• Cisco Compatible Wireless (based on CCX v1.0 and CCX v2.0)</li> <li>• Wi-Fi</li> <li>• WHQL</li> <li>• FCC Bulletin OET-65C</li> <li>• RSS-102</li> </ul>	
<b>Power Management</b>				
Power management levels available: <ul style="list-style-type: none"> <li>• CAM (Constantly Awake Mode)</li> <li>• Fast PSP (Power Save Mode)</li> <li>• Max PSP (Maximum Power Savings)</li> </ul>				
<b>Antenna</b>				
Integrated diversity dual-band 2.4/5 GHz antenna				
<b>Security Architecture Client Authentication</b>				
Cisco Wireless Security Suite supporting Wi-Fi Protected Access (WPA) including: <p>Authentication:</p> <ul style="list-style-type: none"> <li>• 802.1X support for Cisco LEAP, PEAP-GTC, PEAP-MSCHAPv2, and EAP-TLS</li> <li>• MAC address and by standard 802.11 authentication mechanisms</li> </ul> <p>Encryption:</p> <ul style="list-style-type: none"> <li>• Support for static and dynamic IEEE 802.11 WEP keys of 40 bits and 128 bits</li> <li>• TKIP encryption enhancements: key hashing (per-packet keying), message integrity check (MIC) and broadcast key rotation via Cisco TKIP and WPA TKIP</li> </ul>				
<b>Drivers</b>				
Windows XP and Windows 2000				
<b>Dimensions</b>				
4.72 in. (119.9mm) Wide x 3.12205 in. (79.3mm) High				
<b>Weight</b>				
<ul style="list-style-type: none"> <li>• Standard (frame) PCI w/Antenna: 3.64 oz. (103.2 g)</li> <li>• Standard (frame) PCI w/o Antenna: 1.92 oz. (54.7 g)</li> <li>• Low Profile PCI w/Antenna: 3.43 oz. (97.5 g)</li> <li>• Low Profile PCI w/o Antenna: 1.72 oz. (49.0 g)</li> </ul>				

#### Environmental

Non-operating (Storage) Temperature:

- 0°C to +85°C

Operating Temperature:

- 0°C to +70°C

Humidity (non-condensing):

- 10–90%

#### Warranty

One Year

#### Wi-Fi Certification



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